

REMARKS/ARGUMENTS

In the Office Action mailed October 2, 2008, claims 1-11 were rejected. Additionally, claims 1-3, 9, and 10 were objected to. In response, Applicant hereby requests reconsideration of the application in view of the amendments and the below-provided remarks. No claims are added or canceled.

For reference, claims 1-4 and 6-10 are amended to clarify the language of the claims. Claim 5 is amended to specify concentrations of the lower-doped regions and the higher-doped regions. This amendment is supported by page 6, lines 16-18. Claim 8 is amended to depend from claim 7.

Claim Objections

Claims 1-3, 9, and 10 were objected to because of informalities. These claims are amended to clarify the language of each claim. Applicant respectfully requests these claim objections be withdrawn.

Allowable Subject Matter

Applicant appreciates the Examiner's review of the claims and determination that claims 5-7 recite allowable subject matter. In particular, the Office Action states that claims 5-7 would be allowable if rewritten to overcome the rejections under 35 U.S.C. 112, second paragraph, including all of the limitations of the base claim and any intervening claims.

While the Office Action provides a statement of reasons for the indication of allowable subject matter, the Office Action's statement is directed to specific aspects of certain claims and not necessarily all of the claims. Applicant notes that the Office Action's comments may have paraphrased the language of the claims and it should be understood that the language of the claims themselves set out the scope of the claims. Thus, it is noted that the claim language should be viewed in light of the exact language of the claim rather than any paraphrasing or implied limitations thereof.

Claim Rejections under 35 U.S.C. 112

Claims 5-8 and 10 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. In particular, claims 5-7 were rejected because of the terms “lower-doped regions” and “higher-doped regions.” Additionally, claim 8 was rejected for reciting the phrase “the semiconductor.” Additionally, claim 10 was rejected for reciting the phrase “etching the semiconductor away from the trenches.”

In regard to the rejection of claim 5, claim 5 is amended to include specific concentrations of the lower-doped and the higher-doped regions. In regard to the rejections of claims 6 and 7, claims 6 and 7 depend from claim 5 which provides the standard for the “lower-doped regions” and the “higher-doped regions.” In regard to the rejection of claim 8, claim 8 is amended to depend from claim 7. In regard to the rejection of claim 10, claim 10 is amended to clarify the language.

Accordingly, Applicant submits that claims 5-8 and 10, as amended, are not indefinite and respectfully requests that the rejections of claims 5-8 and 10 under 35 U.S.C. 112, second paragraph, be withdrawn.

Claim Rejections under 35 U.S.C. 102 and 103

Claims 1-4, 8, and 11 were rejected under 35 U.S.C. 102(b) as being anticipated by Yamada (U.S. Pat. No. 6,160,288, hereinafter Yamada). Additionally, claims 9 and 10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada in view of Takei et al. (U.S. Pat. Pub. No. 2005/0082640, hereinafter Takei). However, Applicant respectfully submits that these claims are patentable over Yamada and Takei for the reasons provided below.

Independent Claim 1

Claim 1 recites “providing a substrate having a first major surface having a low-doped region at the first major surface, the low-doped region having a concentration of less than $5 \times 10^{14} \text{ cm}^{-3}$ at the first major surface” (emphasis added).

In contrast, Yamada does not disclose the concentration of the low-doped region of the first major surface. The Office Action cites 10^{13} to 10^{14} cm^{-2} , as disclosing this

limitation of the claim. Yamada, col. 9, lines 20-21. However, Yamada merely discloses the level of the impurity dose applied to the epitaxial layer, not the impurity concentration of the low-doped region. Yamada, col. 9, lines 20-21. Dosages are described as the amount of impurity to be applied per square centimeter. Concentrations are the amount of impurity per cubic centimeter. Yamada describes an impurity dosage level, not an impurity concentration, as recited in the claim. Yamada, col. 9, lines 20-21. Yamada is totally silent on impurity concentration and merely discloses ranges of impurity dosage levels. Moreover, the disclosure does not provide the voltage potential in keV that is applied to the impurity implant, and the disclosure does not provide the duration of the anneal process used to diffuse the implant. Without this information, the level of impurity concentration cannot be determined from the impurity dosage level disclosed by Yamada. Therefore, Yamada does not disclose the low-doped region having a impurity concentration of less than $5 \times 10^{14} \text{ cm}^{-3}$ at the first major surface, because Yamada merely discloses an impurity dosage level without disclosing the potential applied to the implant and the duration of the anneal process.

For the reasons presented above, Yamada does not disclose all of the limitations of the claim because Yamada does not disclose the low-doped region having a concentration of less than $5 \times 10^{14} \text{ cm}^{-3}$ at the first major surface. Accordingly, Applicant respectfully asserts claim 1 is patentable over Yamada because Yamada does not disclose all of the limitations of the claim.

Dependent Claims

Claims 2-11 depend from and incorporate all of the limitations of the corresponding independent claim 1. Applicant respectfully asserts claims 2-11 are allowable based on an allowable base claim. Additionally, each of claims 2-11 may be allowable for further reasons, as described below.

In regard to claim 3, Applicant respectfully submits that claim 3 is patentable over Yamada because Yamada does not disclose all the limitations of the claim. Claim 3 recites “the insulated gate field effect transistor structure formed in the diffusion step has an additionally doped region of first conductivity type at the base of the gate trenches having a doping density below $5 \times 10^{16} \text{ cm}^{-3}$ but higher than in the drain regions between

the gate trenches” (emphasis added). In contrast, the cited portion of Yamada (col. 9, lines 42-45) merely discloses the impurity dosage applied to the region immediately below the trenches, not the doping density (impurity concentration) at the base of the gate trenches. Here, although the language of claim 3 differs from the language of claim 1, and the scope of claim 3 should be interpreted independently of claim 1, Applicant respectfully asserts that the remarks provided above in regard to the rejection of claim 1 also apply to the rejection of claim 3. Accordingly, Applicant respectfully asserts claim 3 is patentable over Yamada because Yamada does not disclose the base of the gate trenches having a doping density below $5 \times 10^{16} \text{ cm}^{-3}$ but higher than in the drain regions between the gate trenches.

CONCLUSION

Applicant respectfully requests reconsideration of the claims in view of the amendments and remarks made herein. A notice of allowance is earnestly solicited.

At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account **50-3444** pursuant to 37 C.F.R. 1.25. Additionally, please charge any fees to Deposit Account **50-3444** under 37 C.F.R. 1.16, 1.17, 1.19, 1.20 and 1.21.

Respectfully submitted,

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